

# Object Visibility SAP & Observation Locator TAP

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*1 Quasar for ESA*

*2 TPZ-VEGA for ESA*

*3 ATG for ESA*

*4 ESA*

A large, light blue arrow pointing to the right, with a darker blue rounded rectangle in the center containing the text 'Use Case'.

# Use Case

# All information about Target Visibility Checks is there...



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## Object Visibility – STARALT

Staralt is a program that shows the observability of objects in various ways: either you can plot altitude against time for a particular night (Staralt), or plot the path of your objects across the sky for a particular night (Startrack), or plot how altitude changes over a year (Starobs), or get a table with the best observing date for each object (Starmult). For further information, click on the "help" button at the bottom of the page.

**Mode** Staralt

**Night** 12 October 2017 or date when the local night starts. *Staralt, Startrack only.*

**Observatory** La Silla Observatory (Chile)  
 Select one above or specify your own site with this format:  
 Longitude(°East) Latitude(°) Altitude(metres) UTC offset(hours)  
 Ex.: 289.2767 -30.2283 2725 -4

**Coordinates** 50.0 -70.2

Formats can be any of these:  
 name hh mm ss tdd mm ss  
 name hh:mm:ss tdd:mm:ss  
 name ddd.ddd dd.ddd  
 name must be a single word with no dots, avoid using single numbers. Every entry must be in the same format, do not use different formats with different entries. We recommend a maximum of 100 targets per submission.

RA & dec: 5 23 34.5, -69 45 22, epoch 2000.0  
 Site long&lat: +4 41 36.8 (h,m,s) West, -24 37 30 North

Shown: local eve. date, moon phase, hr ang and sec.z at (2) natural center of night, and (3) morning twilight; t nighttime hours during which object is at sec.z less than Night (and twilight) is defined by sun altitude < -18.0

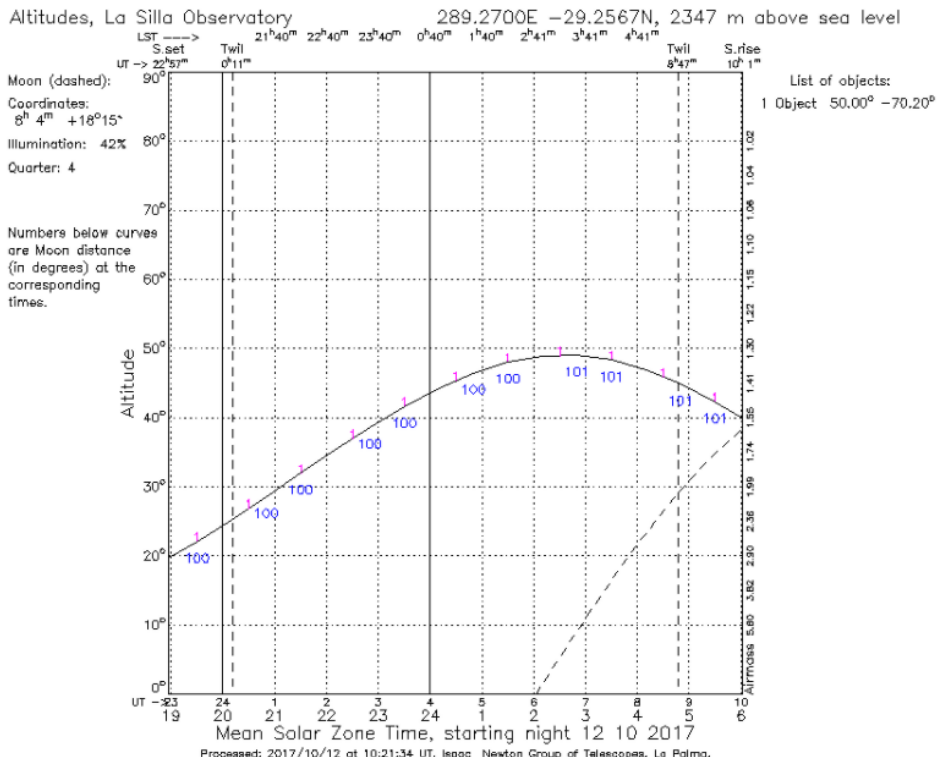
Date (eve) moon eve cent morn  
 HA sec.z HA sec.z HA sec.z  
 2017 Nov 3 F -6 52 3.1 -2 45 1.6 +1 21  
 2017 Nov 17 N -5 44 2.4 -1 49 1.5 +2 07

Rev.	(yyyy-mm-dd hh:mm)	Duration (s)	Vis. (yyyy-mm)
3397	2018-06-28 02:58	27036	2018-06-28 10:29
3398	2018-06-29 12:49	78126	2018-06-30 10:31
3399	2018-07-01 12:42	78063	2018-07-02 10:23
3400	2018-07-03 12:35	77939	2018-07-04 10:14
3401	2018-07-05 12:29	77804	2018-07-06 10:06
3402	2018-07-07 12:22	77715	2018-07-08 09:58
3403	2018-07-09 12:15	78302	2018-07-10 10:00
3404	2018-07-11 12:07	78348	2018-07-12 09:53

TY CHECKER

OBJECTS RETURNED BELOW.

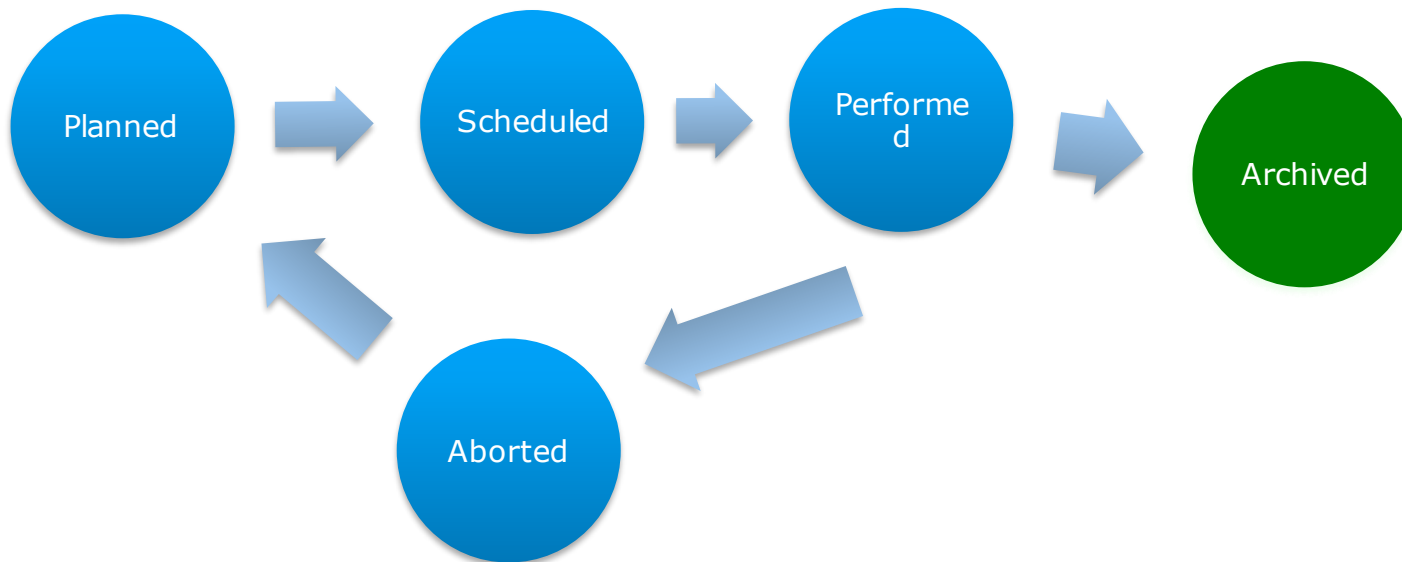
Go!



Altitude	0.47	0.92	77.3	69.5
75000	0.47	0.92	78.8	68.5
75000	0.47	0.93	80.4	67.4
75000	0.47	0.93	82.0	66.3

StarCalc provided by courtesy of John Thorstensen, Dartmouth College. [John.Thorstensen@dartmouth.edu](mailto:John.Thorstensen@dartmouth.edu)

# Observations Life cycle



- Understand SAP protocol
- Explain the ObjVisSAP protocol
- Identify difficult steps into the implementation
- Get feedback from the different partners to understand the status and possible support

A diagram consisting of a large, light blue arrow pointing to the right. Inside the arrow, there are two rounded rectangular boxes, one on the left and one on the right, both filled with a darker blue color. The left box contains the text 'Use Case' and the right box contains the text 'Architecture'.

Use Case

Architecture

# ObjVisSAP architecture

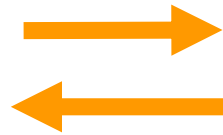
## VISIBILITY CALCULATION



## WEB SERVICE



## CLIENT REQUEST



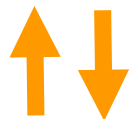
<http://www.ivoa.net/documents/ObjVisSAP/20200514/WD-ObjVisSAP-1.0-20200514.pdf>

# ObjVisSAP XMM-Newton Case

## VISIBILITY CALCULATION Flight Dynamic Software



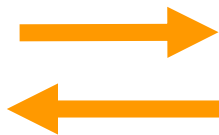
**F90 Software**  
+  
**Orbit data**  
**SunOS**



**Ops LAN**



**PROXY SERVER**



**WEB SERVICE**



**CLIENT REQUEST**



<http://www.ivoa.net/documents/ObjVisSAP/20200514/WD-ObjVisSAP-1.0-20200514.pdf>



# ObjVisSAP INTEGRAL Case



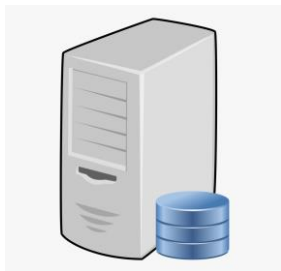
## VISIBILITY CALCULATION Flight Dynamic Software



**F90 Software**  
+  
**Orbit data**  
**SunOS**



**Ops LAN**

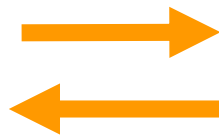


**BinMap**

**WEB SERVICE**



**CLIENT REQUEST**



<http://www.ivoa.net/documents/ObjVisSAP/20200514/WD-ObjVisSAP-1.0-20200514.pdf>

- Define the standard for retrieving visibility time intervals through a uniform interface within the VO framework for given object coordinates to be observed by a given Astronomical Observatory.
  - ❑ Queries encoded as URLs.
  - ❑ The use of VOTable for encoding search results.
  - ❑ The mechanism for handling errors.
  - ❑ The retrieval of service metadata.

# Why SAP?

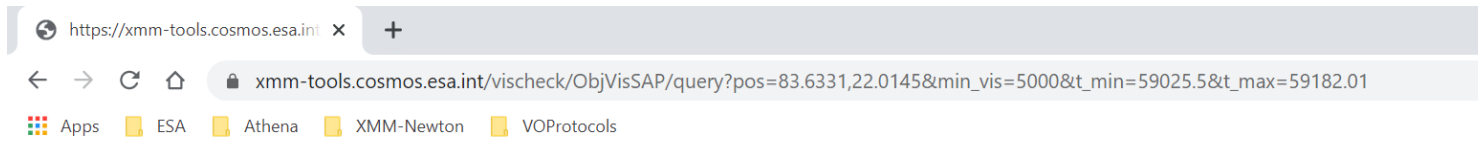


- **SAP (Simple Access Protocol)** is an http based protocol used in the IVOA.
- A member of an integrated family of data access interfaces altogether comprising the Data Access Layer (DAL) of the IVOA
- Used in the IVOA for Simple Image Access Protocol (Dowler, Tody and Bonnarel, IVOA Simple Image Access. Version 2.0 2015) and Simple Spectra Access Protocol (Tody, et al. 2012).
- Keywords *compliance*: MUST, REQUIRED, SHOULD, MAY
- The response is a VOTable that describes the constraint-free visibility time windows.

# Query Examples

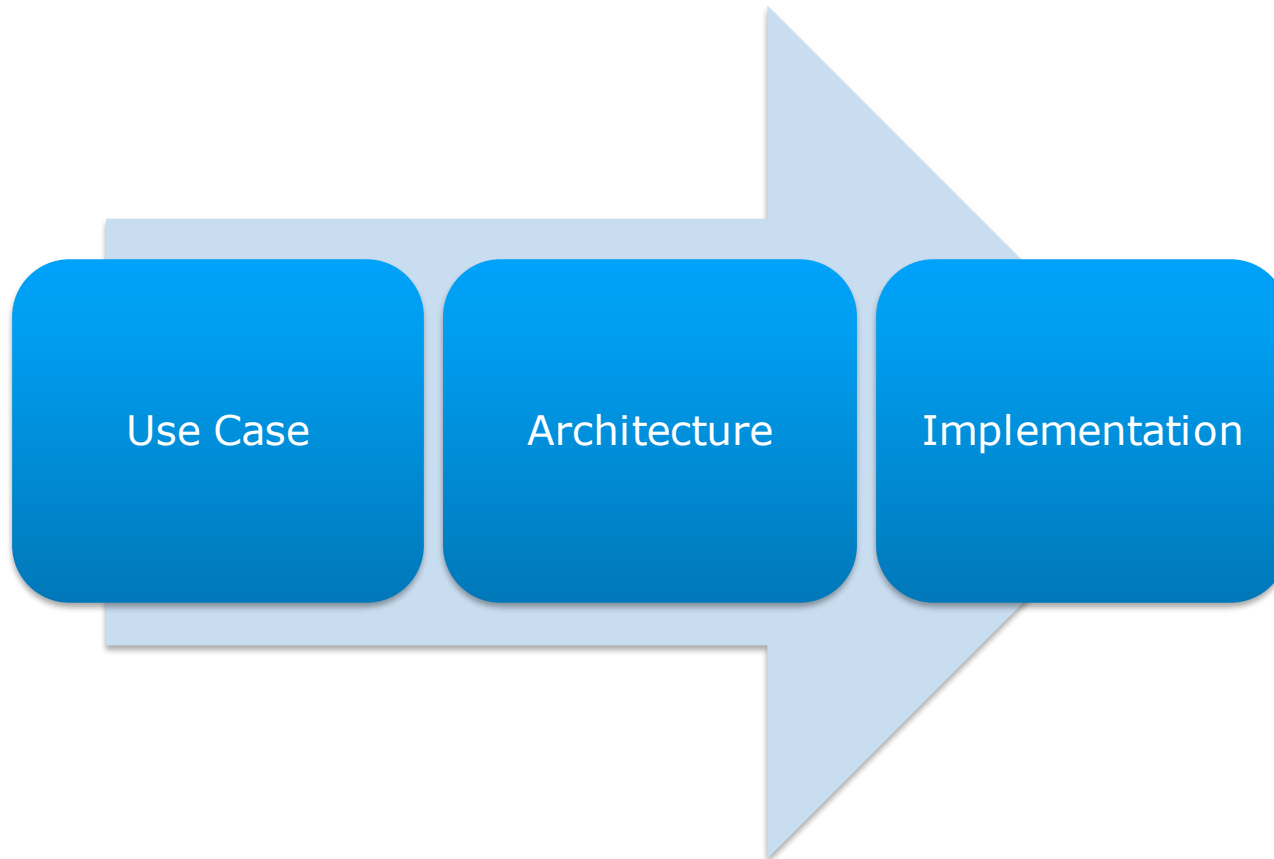


[https://xmm-tools.cosmos.esa.int/vischeck/ObjVisSAP/get?pos=83.6331,22.0145&min\\_vis=5000&t\\_min=59025.5&t\\_max=59182.01](https://xmm-tools.cosmos.esa.int/vischeck/ObjVisSAP/get?pos=83.6331,22.0145&min_vis=5000&t_min=59025.5&t_max=59182.01)



This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
<VOTABLE version="1.1">
  <RESOURCE>
    <DESCRIPTION>return the visibility of any location for the XMM-NEWTON Observatory</DESCRIPTION>
    <PARAM arraysize="*" datatype="char" name="Author" ucd="meta.bib.author" value="Jose A Quero"/>
    <INFO name="QUERY_STATUS" value="OK"/>
    <INFO name="SERVICE_PROTOCOL" value="1.0">ObjVisSAP</INFO>
    <INFO name="REQUEST" value="queryData"/>
    <INFO name="POS" value="83.6331,22.0145"/>
    <INFO name="T_MIN" value="59025.5"/>
    <INFO name="T_MAX" value="59182.01"/>
    <TABLE>
      <FIELD datatype="double" name="t_validity" unit="d"/>
      <FIELD datatype="timestamp" name="t_start" unit="d"/>
      <FIELD datatype="timestamp" name="t_end" unit="d"/>
      <FIELD datatype="double" name="t_visibility" unit="s"/>
      <FIELD datatype="char" name="Rev" unit="string"/>
      <FIELD datatype="double" name="Round" unit="s"/>
      <FIELD datatype="double" name="StarPh" unit="arcmin"/>
      <FIELD datatype="double" name="EndPh" unit="arcmin"/>
      <FIELD datatype="double" name="SolarA" unit="deg"/>
      <FIELD datatype="double" name="AstroA" unit="deg"/>
    <DATA>
      <TABLEDATA>
        <TR>
          <TD>59929.00</TD>
          <TD>59099.55</TD>
          <TD>59100.50</TD>
          <TD>81794</TD>
          <TD>3800</TD>
          <TD>80000</TD>
          <TD>0.12</TD>
          <TD>0.59</TD>
          <TD>81.4</TD>
          <TD>87.3</TD>
        </TR>
      </TABLEDATA>
    </DATA>
  </RESOURCE>
</VOTABLE>
```



- Install Web Framework:
  - Tomcat
  - Django
  - ??
- Develop the web service
  - java
  - python
  - php
- Call your visibility calculator or lookup table with the visibility information
- Use VOTable library to create the output
- send the data to the web service

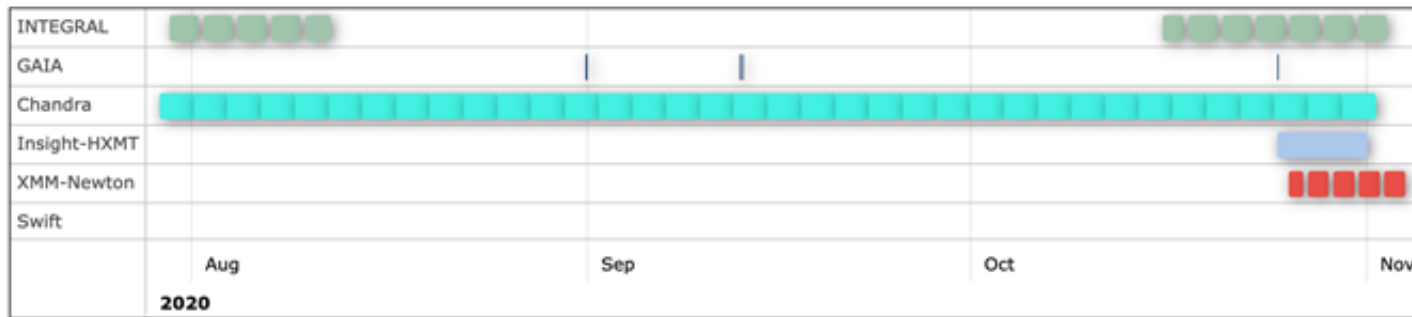
- Github Python example:
  - <https://github.com/emiliosalazardonate/visibility-service>
  - Template for creating a basic web service
  - Decoupled view of visibility method. Each observatory must provide the latter.
  - Uses
    - Django (python) as web framework
    - Astropy (python) for generating the votables.

# Reference implementation client



After successful implementation, contact E. Salazar for integration into:  
<http://integral.esa.int/toby/>

## Visibility



## Schedule



Other clients expected: MySpaceCal (calendar for many missions), ESASky, etc



Thanks!